UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region III - 6th & Walnut Sts.
Philadelphia, Pa. 19106

161769

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SUBJECT: PRELIMINARY TOXICOLOGIC ASSESSMENT - SHAFFER SITE

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The Shaffer Site in Minden, WV, is heavily contaminated with PCBs which have migrated offsite into sediments of the adjacent Arbuckle Creek. Preliminary sample analyses have shown PCBs as high as 27 percent in stained soil on-site and at 190 ppm in sediments of the Creek downstream from the Site. Contamination of over 1000 cubic yards in excess of 50 ppm and the presence of 150 transformers, 60 capacitors and 75 drums on-site further define the potential for continuing offsite migration of PCBs.

Polychlorinated biphenyls (PCBs) are among the most toxic substances known. It is thought that the bulk of their toxicity derives from contamination by polychlorinated dibenzofurans (PCDFs), which contaminants are nearly as toxic as polychlorinated dibenzodioxins (PCDDs). Some PCDF isomers are half as toxic as their PCDD congeners, including 2,3,7,8-TCDF, which makes this frequent contaminant of PCBs the second most toxic substance known.

ORIGINAL (Red)

PCBs cause cancer in experimental animals and are suspect carcinogens in humans. In addition, in man, they cause liver damage, changes in skin pigmentation, neurologic damage and chloracne. PCBs cross the placenta and are fetotoxic. They also bioconcentrate in body tissues and secretions, including female breast milk, and thus are of continuing health risk to newborns of exposed nursing mothers.

PCBs are extremely stable compounds in soil and sediments with half-lives in excess of 20 years. They are lipophilic with low water solubility and hence bioaccumulate in fatty tissues of soil microorganisms and invertebrates which consume them. As the food chain ascends toward man, bioaccumulation accelerates such that man, the ultimate predator, becomes contaminated with the highest levels of PCBs from polluted soil or drinking water.

Acute symptoms of PCB poisoning include skin rashes with gradual discoloration, nausea and nervous dysfunction (including dizziness and disorientation). Subchronic exposures lead to loss of vital liver functions accompanied by jaundice and concomitant immunologic impairment. Chronic health problems (which may derive from a single episode of exposure) include cancer and

The most frequent cancers seen in experimental animals are hepatocellular carcinomas, but cancers at many other organ sites are seen as well. The carcinogenic mechanism of PCBs is complex, but appears to be of both initiating and promoting types. As an initiator, PCBs must be metabolized to ultimate carcinogens which bind to an oncogene in DNA and cause it to undergo mutation. PCBs also promote carcinogenesis by activating hepatic and other cellular cytochrome-P-450 oxidases. These oxidases are responsible for carcinogenic activation of polycyclic aromatic hydrocarbons (and probably of PCBs, themselves.)

Much of the human epidemiologic data comes from the Yushu incident in Japan ("yushu" being Japanese for rice oil). In this incident, rice oil contaminated with PCBs was sold illicitly and contaminated many families. Abortions and stillbirths increased among Yushu families. Congenital malformations and "cola babies," so named from their brown pigmentation of skin, increased among live births. Skin problems including rashes and chloracne increased among Yushu adults as did numbers of infections and liver diseases. Early indications from followup epidemiologic studies are that cancer incidence has increased among Yushu victims, although it will take years before the final story is known.

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